THE BIG 5 International Building & Construction Show

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DUBAI WORLD TRADE CENTRE

Reducing the Carbon Footprint in Concrete

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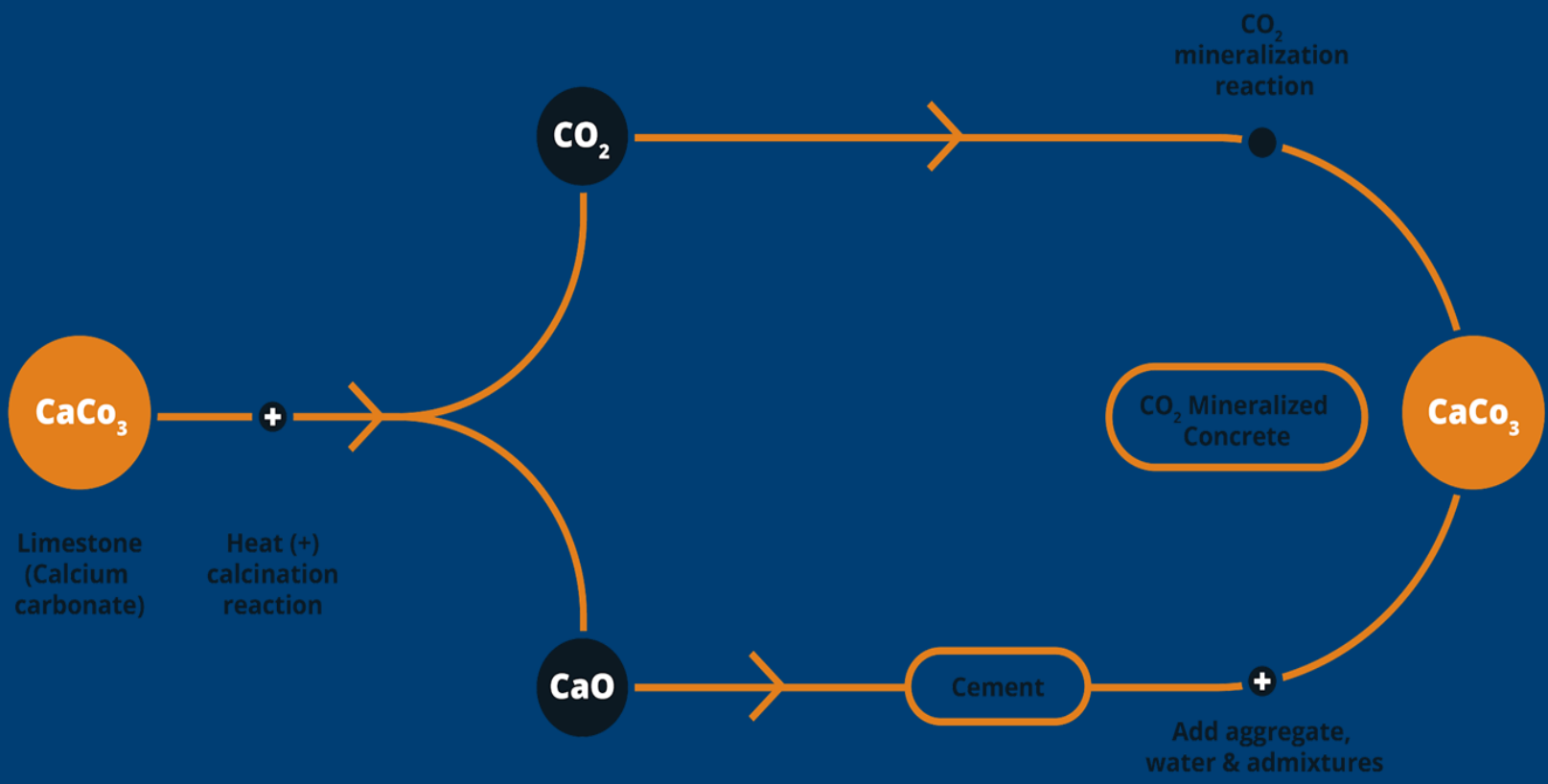
CarbonCure Technologies

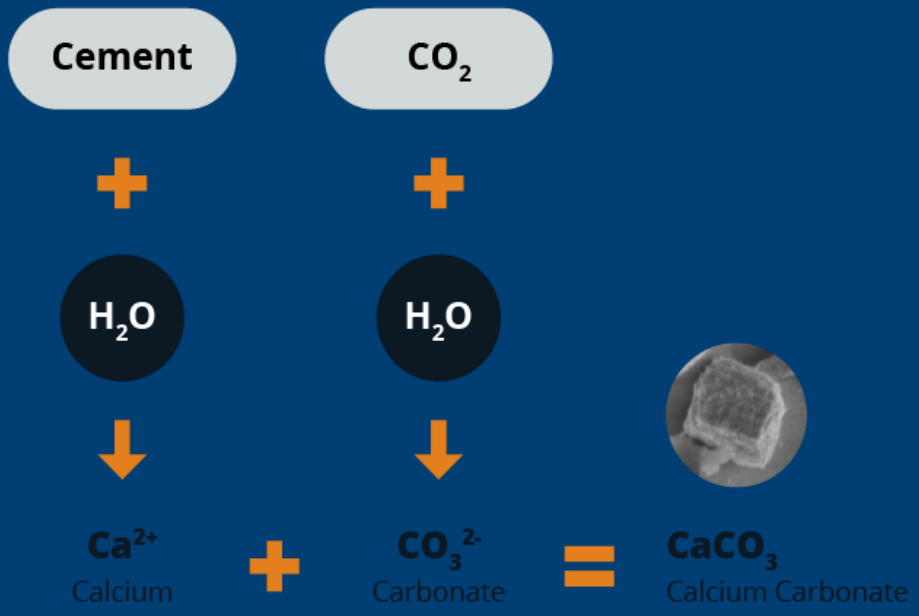
Introduction

- CarbonCure reduces CO_2 by utilization of CO_2 (mineralization) and reduce cement loading (avoidance)
- Total CO2 savings 225,000+ metric tonnes of CO2 saved (utilization & avoidance)
- Waste CO_2 sourced locally in-market

CO_2 Mineralization in Concrete

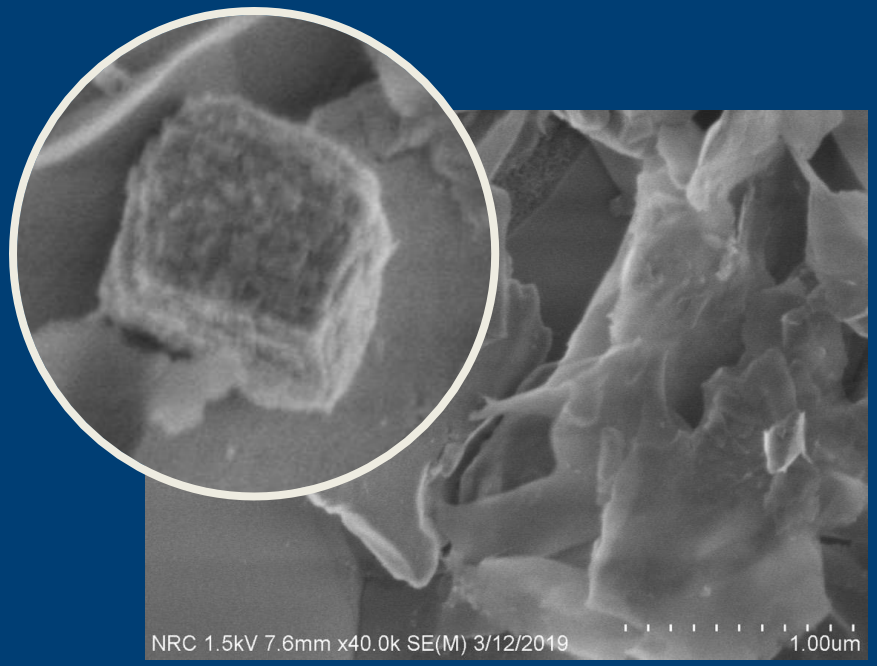


What Happens with CO2 Injection



- CO_2 mineralization reaction occurs
- CO_2 converts into **$CaCO_3$ (solid limestone)**

Converting CO_2 to a Mineral



Carbonate product formed
about 400 nm dimension

Nano-calcium carbonate particles act as nucleation sites for hydration. Compressive strength benefits arise from this interaction.

Mixer Technology

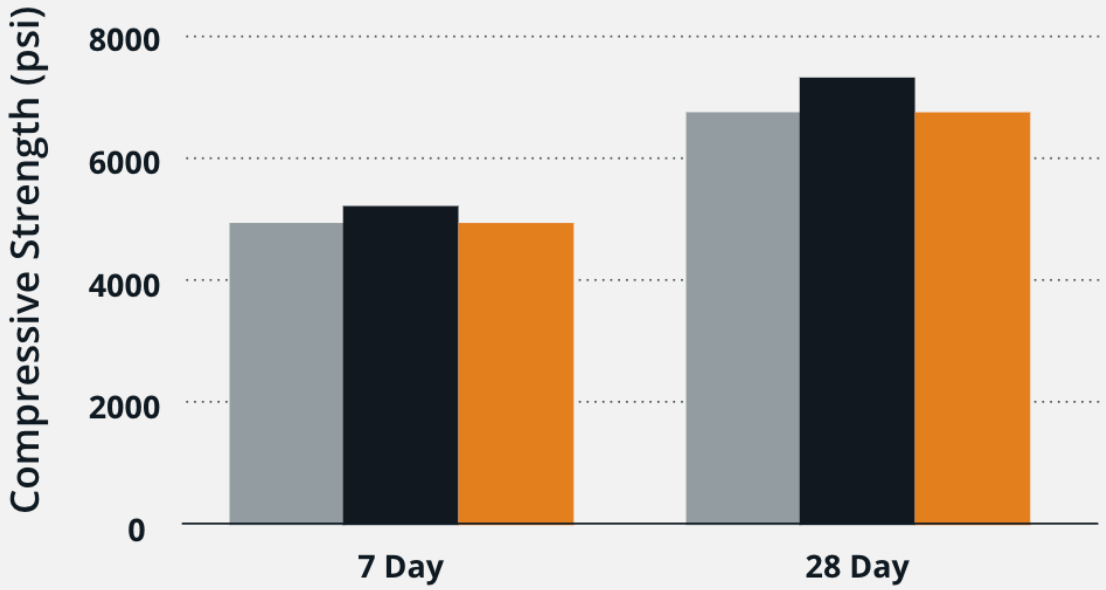
VALUE OF MINERALIZED CO_2

- Cement reduction
- Material savings

ENVIRONMENTAL BENEFIT

- Carbon footprint reduction of **15-20 kg per cubic meter** of concrete

Mix Adjustment



Source: *"Calculating Sustainability Impacts of CarbonCure Ready Mix" (2017).*

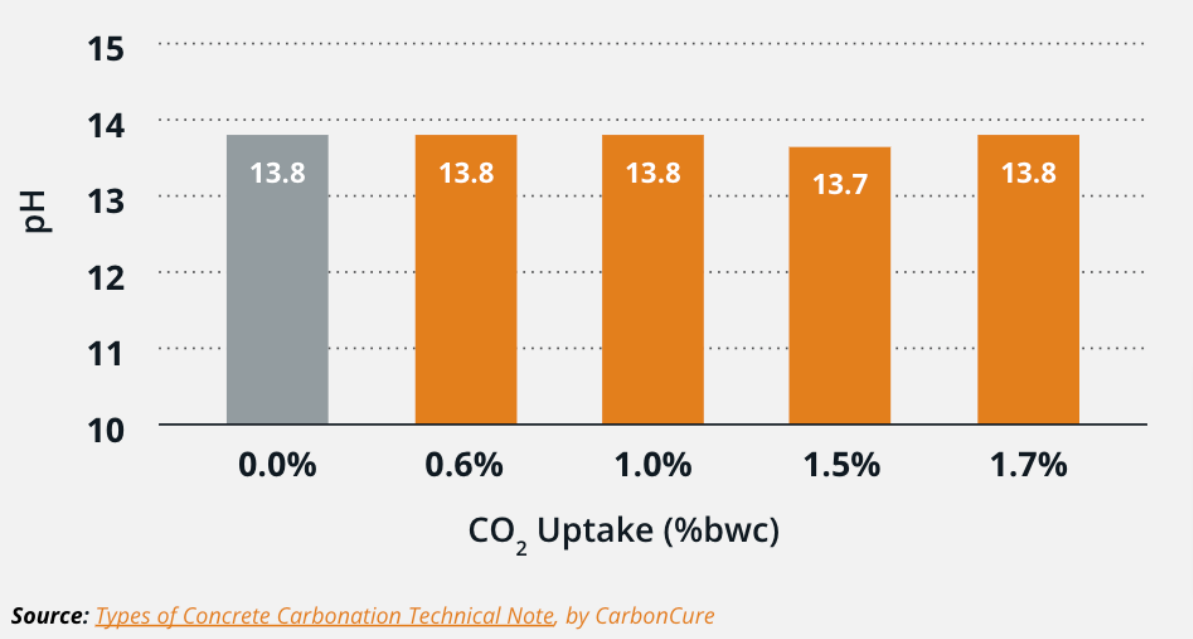
Performance & Validation – Durability

Extensive durability testing has verified that there are no adverse impacts, including:

- Academic studies by University of Toronto,
  University of New Brunswick & Nanyang Technological University of Singapore
- US State Depts of Transportation
- Concrete producer verification
- Third party concrete consultants

Carbonation vs. Corrosion

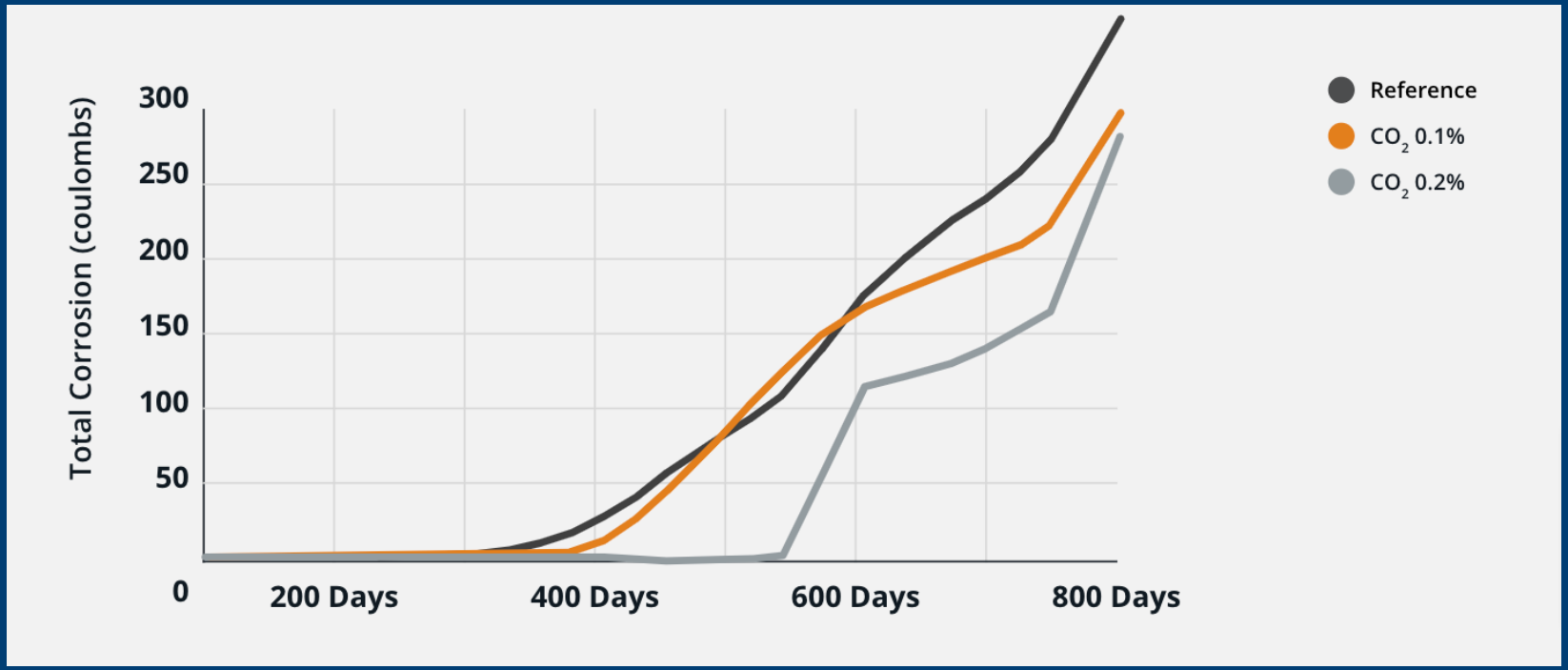
Impact of CO_2 Injection on the pH of Pore Solution Extracted from Carbonated Paste Samples at 28 Days



Source: *Types of Concrete Carbonation Technical Note, by CarbonCure*

Testing has shown that early carbonation has no impact on the pH of concrete, and therefore has **no impact on corrosion.**

ASTM G109 – Reinforcement Corrosion



Global Impact

How to drive additional CO_2 Savings?

Reclaimed Water Technology

CONVERT WASTES TO VALUE

- Reclaim water as a beneficial & predictable resource
- Cost savings via reduced virgin materials & minimized waste

ENVIRONMENTAL BENEFIT

- Carbon footprint reduction (15 kg per cubic meter concrete)
- Ability to achieve net zero discharge concrete operations

Recycled Concrete Aggregate

CONVERT WASTES TO VALUE

- Concrete as a carbon sink
- Permanent CO_2 mineralization
- Improved material properties of treated aggregate

ENVIRONMENTAL BENEFIT

- Carbon footprint reduction (50 kg per cubic meter concrete)
- Circular recycling within the built environment value chain

The Future

- Increased awareness of embodied carbon
- Carbon performance tied to bid value
- Circular utilization of CO2 from cement plants
- Urgency – innovation-friendly landscape of codes, specifications, and procurement

Thank you

For the most up-to-date information please visit the American Concrete Institute at:
www.concrete.org

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